PETITION

Mail Stop Patent Application
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Your Petitioner, Alberto Alvarez-Calderon F., a citizen of Peru, citizen of the United States of America and resident of the State of California, whose residence and mailing address is 410 Fern Glen, La Jolla, California 92037, prays that Letters Patent Protection be granted to him for a

TRANSONIC HULL AND HYDROFIELD (PART III-A)

as set forth in the following specification:

Cross-Reference to Related Application

This continuation-in-part patent application is related to and claims priority from related patent application serial No. 09/677,897 filed October 3, 2000 and from related patent application serial No. 08/814,418 filed March 11, 1997 and issued on December 12, 2000 as U.S. Patent No. 6,158,369.

Background of the Invention

1. Technical Field

The present invention pertains to water-supported vessels such as commercial and military ships, submersibles, yachts, hulls for seaplanes operating in and out of surface effects, and boats in general, including operation of such vessels at high speeds in adverse seas.

2. Description of the Prior Art

The art related to the present application covers all the art cited by Examiner in Applications 08/814,418 and 08/814,417, as well as the art cited by the inventor during the prosecution of

Applications 08/814,418 and 08/814,417. It may also relate to the art in Jane's *High Speed Marine Craft*.

In addition, the art related to the present application may include the Transonic Hull (TH) and Transonic Hydrofield (<u>TH</u>) specified in Patent Application 08/814.418, and the propulsion, controls, and shapes of Transonic Hulls specified in Patent Application 08/814,417.

Although certain vessels having triangular hull planform shape apparently similar in some respect to TH have been prepared in the past (for example, those cited by the Patent Office in the examination of Application 08/814,418), these have been designed to have approximately equal drafts adjacent the stern and the bow, as in conventional ship design. The Japanese Patent 61- 125981A of Mitsubishi Heavy Industries teaches, in all its embodiments, that the draft at stern and bow of this approximately triangular hull planform are approximately equal and the same as midbody draft. In this they followed earlier design criteria, even as far back as that of U.S. Patent 23626 of 1859, which also shows equal draft at bow, stern, and midbody. The deep stern drafts with broad beams at the stern are extremely inefficient.

In both the above-mentioned patents, the location of the center of buoyancy (CB) of their hulls, and therefore the location of their centers of gravity (CG) would be, by reason of their planforms and equal drafts, at or very close to their center of planform areas and waterplane, also known as longitudinal center of flotation (LCF), which is at 66% of water line length aft of the bow, unless a bow bulb is used. This proximity of CG, CB, and LCF is usual for conventional hulls. Moreover, such prior art does not

consider the effects of CB and CG location on drag under forward motion.

In respect to proximity of CG, CB, and LCF, I have discovered that their proximity as in conventional hulls is not viable for TH, because it renders this type of hull with unstable tendencies in pitch under fast motion, when subjected even to a minor pitch disturbance. Such adverse behavior is similar to a phugoid self-sustained oscillation of aircraft when its center of gravity is close to its neutral point. In a ship, such oscillations not only increase drag, but are undesirable for structures, for cargo and for passengers, and may be dangerous.

Such fundamental problems are serious. The Mitsubishi patent teaches a solution to this problem by means of a bow bulb. Thus, it mixes a bulb technology which was developed and is useful for fat, slow ships, with a different type of hull. This adds drag, as well as volume, to their design, and the drag issue is not priority for prior art.

In contrast, TH and <u>TH</u> of Application 08/814,418 make a totally different and innovative solution: it combines, in the submerged portion of TH, a deep draft forward and a shallow draft to the rear, which normal architectural ship design would consider dangerous with an inherent dive potential unless a bow bulb were used. However, following model tests, this writer confirmed that TH theory is correct in that dive tendencies are not determined on a triangular planform. The TH solution renders an inherent distance between LCF and center of buoyancy and therefore has a center of gravity substantially ahead of the LCF. Moreover, the quantitative aspects in the relation between CB, CG, LCF, and stern

draft is dependent, I have discovered in relation to lack of dive tendency and established in respect to payload, with reference to the distinctions between the hydrostatic stern condition and the stern's hydrodynamic condition in the supercritical and subcritical regimes, as is done in the present CIP patent application in respect to limits of distances between LCF, CB, CB, and effect on static draft. Furthermore, these key relations are established in the present work in relation to the hydrodynamic drag consequence of entry and exit flow angles in its various speed regimes.